

CLAIMS

1. Optical fiber comprising:
 - a glass portion;
 - at least one protective coating of thermoplastic material comprising at least one thermoplastic elastomer;characterized in that said thermoplastic material has the following characteristics:
 - a modulus of elasticity value at +25°C lower than 150 MPa;
 - a Vicat point higher than 85°C.
2. Optical fiber according to claim 1, wherein the thermoplastic material has a modulus of elasticity value at +25°C of at least 10 MPa.
3. Optical fiber according to claim 2, wherein the thermoplastic material has a modulus of elasticity value at +25°C higher than 20 MPa.
4. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material has a Vicat point higher than 120°C.
5. Optical fiber according to claim 4, wherein the thermoplastic material has a Vicat point lower than 350°C.
6. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material has a melting point higher than 180°C.
7. Optical fiber according to claim 6, wherein the thermoplastic material has a melting point not higher than 350°C.
8. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material has a water absorption value, measured at 55°C, not higher than 2%.
9. Optical fiber according to claim 8, wherein the thermoplastic material has a water absorption

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value, measured at 55°C, not higher than 1%.

10. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material has a Melt Flow Index (MFI) higher than 1 g/10 min.
11. Optical fiber according to claim 10, wherein the thermoplastic material has a Melt Flow Index (MFI) higher than 5 g/10 min.
12. Optical fiber according to claim 11, wherein the thermoplastic material has a Melt Flow Index (MFI) of between 10 g/10 min and 100 g/10 min.
13. Optical fiber according to any one of the preceding claims, wherein the ratio between the modulus of elasticity value at -40°C and the modulus of elasticity value at +60°C of the thermoplastic material is lower than 15.
14. Optical fiber according to claim 13, wherein the ratio between the modulus of elasticity value at -40°C and the modulus of elasticity value at +60°C of the thermoplastic material is of between 1 and 10.
15. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material is a thermoplastic elastomer (a).
16. Optical fiber according to any one of the preceding claims, wherein the protective coating is a single protective coating which is directly positioned onto the glass portion.
17. Optical fiber according to any one of claims 1 to 15, wherein the single protective coating includes an inner layer of thermoplastic material directly positioned onto the glass portion, and an outer layer of thermoplastic material comprising at least one colouring agent directly positioned onto said inner layer.

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18. Optical fiber according to any one of the preceding claims, wherein the thermoplastic elastomer (a) is selected from:
- (a1) copolyether esters or copolyester esters;
 - 5 (a2) styrene block copolymers or terpolymers with different olefins and/or with dienes;
 - (a3) copolymer of ethylene with at least one aromatic α -olefin.
19. Optical fiber according to claim 18, wherein the
10 copolyether esters comprises poly[(C₁-C₈) linear or cyclic]alkylene terephthalate segments and poly(C₁-C₈) linear alkylene oxide segments.
20. Optical fiber according to claim 19, wherein the
15 poly[(C₁-C₈) linear or cyclic]alkylene terephthalate segments are selected from: poly(butylene-naphthalene dicarboxylic acid), poly(cyclohexanedicarboxylic acid-cyclohexanemethanol), polybutyleneterephthalate and polytrimethyleneterephthalate-2,6-
20 naphthalate.
21. Optical fiber according to claim 19, wherein the poly(C₁-C₈) linear alkylene oxide segments are selected from polyalkylene oxides.
22. Optical fiber according to claim 21, wherein the
25 polyalkylene oxides are polytetramethylene oxide, polypropylene oxide, polyethylene oxide.
23. Optical fiber according to claim 18, wherein the copolyester esters comprises poly[(C₁-C₈) linear or cyclic]alkylene terephthalate segments and
30 (C₁-C₈) linear aliphathic polyester segments.
24. Optical fiber according to claim 23, wherein the
poly[(C₁-C₈) linear or cyclic]alkylene terephthalate segments are selected from: poly(butylene-naphthalene dicarboxylic acid),
35 poly(cyclohexanedicarboxylic acid-

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cyclohexanemethanol), polybutyleneterephthalate and polytrimethyleneterephthalate-2,6-naphthalate.

25. Optical fiber according to claim 23, wherein the
 5 (C₁-C₈) linear aliphathic polyester segments are selected from: polybutylene adipate, polytetramethylene adipate, polycaprolactone.
26. Optical fiber according to claim 18, wherein the
 10 styrene block copolymers or terpolymers with different olefins and/or with dienes (a₂) are selected from: styrene-butadiene-styrene (S-B-S), styrene-isoprene-styrene (S-I-S) and styrene-ethylene/butene-styrene (S-EB-S)
 15 triblock polymers; styrene-ethylene/propylene (S-EP) and styrene-ethylene/butene (S-EB) diblock polymers; styrene-butadiene or styrene-isoprene branched polymers.
27. Optical fiber according to claim 18, wherein in
 20 the copolymer (a₃) the aromatic α -olefin is an olefin of formula (I):

$$\text{CH}_2=\text{CH}-(\text{R}_1\text{R}_2\text{C})_x-\text{C}_6\text{H}_{5-y}(\text{R}_3)_y \quad (\text{I})$$
 wherein R₁, R₂ and R₃, which may be identical to or different from each other, represent hydrogen or a linear or branched alkyl group containing
 25 from 1 to 8 carbon atoms; or R₃, different from R₁ and R₂, represents an alkoxy group, a carboxyl group, an acyloxy group, said acyloxy group optionally being substituted with alkyl groups containing from 1 to 8 carbon atoms or hydroxyl
 30 groups or halogen atoms; x is 0 or an integer between 1 and 5 inclusive; y is 0, 1 or 2.
28. Optical fiber according to claim 27, wherein the
 35 olefin of formula (I) is styrene; mono- or polyalkylstyrenes; styrene derivatives containing functional groups; phenyl-substituted

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alkenes; or mixtures thereof.

29. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material comprises at least one thermoplastic crystalline polymer (b).
30. Optical fiber according to claim 29, wherein the thermoplastic crystalline polymer (b) has a melting point higher than 180°C.
31. Optical fiber according to claim 30, wherein the thermoplastic crystalline polymer (b) has a melting point not higher than 350°C.
32. Optical fiber according to any one of claims 29 to 31, wherein the thermoplastic crystalline polymer (b) is selected from: syndiotactic polystyrene; poly(4-methyl-1-pentene), either as a homopolymer or as a copolymer with an α -olefin; polyketones; poly(phenylene sulfide); or mixtures thereof.
33. Optical fiber according to any one of claims 29 to 31, wherein the thermoplastic crystalline polymer (b) is selected from: polyesters; polyamide; or mixtures thereof.
34. Optical fiber according to any one of claim 29 to 33, wherein the thermoplastic crystalline polymer (b) is present in the thermoplastic material in an amount of from 10% to 45% by weight with respect to the weight of the thermoplastic material.
35. Optical fiber according to claim 34, wherein the thermoplastic crystalline polymer (b) is present in the thermoplastic material in an amount of from 20% to 35% by weight with respect to the weight of the thermoplastic material.
36. Optical fiber according to any one of claims 1 to 28, wherein the thermoplastic material

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comprises at least one amorphous polymer (c).

37. Optical fiber according to claim 36, wherein the amorphous polymer (c) has a glass transition temperature (T_g) higher than 180°C.
- 5 38. Optical fiber according to claim 36, wherein the amorphous polymer (c) has a glass transition temperature (T_g) not higher than 350°C.
39. Optical fiber according to any one of claims 36 to 38, wherein the amorphous polymer (c) is
10 selected from: cycloolefin random copolymers; polyphenyleneoxide; aliphatic or aromatic hydrocarbon resins; or mixtures thereof.
40. Optical fiber according to any one of claim 36 to 39, wherein the amorphous polymer (c) is
15 present in the thermoplastic material in an amount of from 10% to 45% by weight with respect to the weight of the thermoplastic material.
41. Optical fiber according to claim 40, wherein the amorphous polymer (c) is present in the
20 thermoplastic material in an amount of from 20% to 35% by weight with respect to the weight of the thermoplastic material.
42. Optical fiber according to claim 18, wherein the thermoplastic material comprises at least one
25 styrene block copolymers or terpolymers with different olefins and/or with dienes (a2) or at least one copolymer of ethylene with at least one aromatic α -olefin and at least a processing oil (d).
- 30 43. Optical fiber according to claim 42, wherein the processing oil (d) is selected from minerals oils, vegetable oils, synthetic oils, or mixtures thereof.
44. Optical fiber according to claims 42 or 43,
35 wherein the processing oil (d) is present in the

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thermoplastic material in an amount of from 2% to 100% by weight with respect to the weight of the thermoplastic material.

- 5 45. Optical fiber according to claim 44, wherein the processing oil (d) is present in the thermoplastic material in an amount of from 5% to 70% by weight with respect to the weight of the thermoplastic material.
- 10 46. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material comprises at least an anti-hydrolysis agent.
- 15 47. Optical fiber according to any one of the preceding claims, wherein the thermoplastic material comprises at least one colouring agent selected from pigments, dyes, coloured fillers.
- 20 48. Optical fiber according to claim 47, wherein the colouring agent is present in the thermoplastic material in an amount of from 0.1% to 10% by weight with respect to the weight of the thermoplastic material.
- 25 49. Optical fiber according to claim 48, wherein the colouring agent is present in the thermoplastic material in an amount of from 0.5% to 5% by weight with respect to the weight of the thermoplastic material.

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